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M/S 010, U.S. Department of Energy  
Office of Civilian Radioactive Waste Management,  
Yucca Mountain Site Characterization Office  
P.O. Box 30307  
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**SUBJECT:** Nuclear Energy Institute (NEI) comments on the Supplement to the Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca, Mountain, Nye County, Nevada

Dear Dr. Summerson:

The Nuclear Energy Institute (NEI),<sup>1</sup> on behalf of the nuclear energy industry, is pleased to submit these comments to the Department of Energy (DOE) on the Supplement to the Draft Environmental Impact Statement (SDEIS) - *Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca, Mountain, Nye County Nevada*, (66 Fed. Reg. 22,540 - May 4, 2001).

NEI and the nuclear energy industry have extensively reviewed both the DEIS and the SDEIS. This review leads us to conclude that the SDEIS should serve

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<sup>1</sup> NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry. NEI's members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, nuclear material licensees, and other organizations and individuals involved in the nuclear energy industry.

to increase the confidence of decision-makers in the long-term performance of deep geologic disposal of used nuclear fuel and other high level radioactive wastes at Yucca Mountain. Our prior comments on the DEIS stated industry's views on the impressive safety case presented therein and offered a number of recommendations to help DOE strengthen its presentation of the compelling scientific evidence that Yucca Mountain can effectively protect public health and safety and the environment. The SDEIS is a significant step forward in the direction of strengthening this safety case.

The environmental impact information in this document constitutes an important additional component of the Yucca Mountain decision-making framework. Since publishing the Draft Environmental Impact Statement (DEIS) for Yucca Mountain in August 1999, DOE has completed a significant number of additional scientific studies and made a number of enhancements to the repository design. The additional material developed strengthens assurances that Yucca Mountain can effectively protect public health and safety and the environment. Notably, the SDEIS shows the long-term radiological impacts associated with the proposed repository will be substantially less than the small impacts previously documented in the DEIS. The SDEIS together with the DEIS contribute to a strong scientific basis upon which to make a national policy decision on the proposed repository at Yucca Mountain this year.

Recognizing its value in the decision-making process, NEI offers the following specific comments on the SDEIS.

**I. The SDEIS provides important evidence that DOE has made significant improvements in the long-term performance of the repository:**

Our views on how these improvements provide increased confidence in the suitability of the proposed repository are expressed in the five comments below.

1...

**A. *The SDEIS provides an expanded design envelope that better enables the project to be responsive to scientific uncertainties***

By its very nature, the repository development process is intended to result in design evolution over time – as scientific and engineering knowledge continue to grow substantially over the several decades to centuries before repository closure. For this reason the Nuclear Regulatory Commission has proposed a 3-step repository licensing process (construction, operation, and closure) with significant confirmatory scientific input throughout. Evolving excellence of design

- 1 cont. is also consistent with the National Academy of Sciences recent recommendation that repository programs should proceed in a "phased or stepwise manner". (*Disposition of High-Level Waste and Spent Nuclear Fuel*, National Academy Press, 2001).

This aspect of geologic repositories presents a particular challenge in the National Environmental Policy Act (NEPA) process as Environmental Impact Statements must look into the future and still provide decision-makers with meaningful information on potential impacts. In producing this SDEIS, DOE has successfully met this challenge by giving decision-makers a more complete range of design alternatives to consider. The additional design options provided herein should improve confidence that scientific uncertainties can be effectively managed.

2 **B. *The SDEIS presents scientific results showing potential long-term radiological impacts to be even lower than previously predicted***

The SDEIS demonstrates that the more the scientific community learns about Yucca Mountain, the more confidence increases in its performance. DOE is effectively combining knowledge gained since the DEIS analysis with a wide range of design options, multiple barriers, performance confirmation, information on natural analogues, and conservative scientific models to show that long-term radiation exposures will be essentially zero<sup>2</sup> for at least 10,000 years and well below natural background thereafter. These dose results are notably less than what was predicted in the DEIS and indicate that the EPA all pathways radiation protection and groundwater protection standards for Yucca Mountain (40 CFR Part 197) can be met with significant margin.

- 3 NEI understands, based on recent DOE presentations to the Nuclear Waste Technical Review Board that DOE will be revising its analysis to postulate 'early failures' of waste packages due to, for example, manufacturing defects. According to these presentations, this new analysis calculates annual doses for the first 10,000 years to no longer be absolute zero, but something less than 0.0001 mrem (a level we consider to be 'essentially zero' since it is a million times less than natural background). NEI endorses this change as further evidence that DOE is taking an appropriate, multiple barrier, approach to repository safety. These new results demonstrate that Yucca Mountain's natural systems are capable of protecting public health and safety even if engineered systems do not perform as designed. DOE should clearly communicate in the FEIS that this new analysis is being added to demonstrate defense-in-depth and that it does not reflect any real decrease in confidence regarding the performance of the repository.

4 C. ***The SDEIS describes analytical modeling techniques that enhance conservatism in DOE's safety case***

DOE continues to use multiple conservative models and assumptions in constructing its repository safety case. The SDEIS effectively describes and evaluates changes made in DOE's analytical approach since the DEIS. It is evident that these changes have maintained a conservative approach to assuring repository safety. DOE has combined this conservative methodology, new information gained since the DEIS was developed, and an enhanced design to provide an improved repository safety case. The result is a performance assessment that is more credible, while yielding a result that shows long-term radiological impacts to be even lower than previously estimated. The fact that these new models apply multiple conservative assumptions and continue to demonstrate that repository performance will protect public health and safety should provide decision-makers with additional confidence. |

5... D. ***The SDEIS describes design changes that provide for increased thermal management flexibility that is both necessary and appropriate***

DOE appropriately has provided for the addition of a used fuel surface aging area to facilitate heat dissipation for up to 40,000 MTHM of used nuclear fuel (as described in Section 2.2.2.2.2 of the SDEIS). This design improvement is an integral part of the repository and is appropriate in accordance with the Nuclear Waste Policy Act and NEPA.

Environmental impacts associated with this change are bounded by the 70,000 MTHM of surface storage called for in the retrieval contingency discussed in Section 4.2.1.1 of the DEIS. This change is necessary to allow DOE to effectively and efficiently manage the thermal characteristics of used fuel received at the repository for disposal prior to emplacement below ground.

Used fuel blending capability is also an integral feature of the thermal management approach for which the aging area discussed above was designed. The modification to the Waste Handling Building to provide used fuel blending capability as described in the SDEIS is an essential element of the new thermal management design strategy described in the SDEIS. Blending at the repository site will be necessary to meet DOE's stated thermal management goals. This design enhancement is also appropriate in accordance with NEPA and the Nuclear Waste Policy Act. The SDEIS and Section E.2.2.6.2 of the DEIS appear to work together to comprehensively evaluate the environmental impacts of this design enhancement. DOE should more clearly communicate the resultant design envelope in the FEIS.

5 cont. Both of these enhancements are compatible with the concept of modular repository construction, where the development of the repository proceeds in parallel with the advance of scientific knowledge over time. Such an approach is consistent with the latest NAS recommendations, appropriate in accordance with NEPA and NWPA, and readily facilitated by the NRC licensing process, which provides for the filing of amendments. |

6 ***E. |The SDEIS provides information on the Yucca Mountain site that is consistent with the overall international scientific consensus on geologic disposal***

It is notable that DOE's Yucca Mountain safety case is advancing in a positive direction at the same time that worldwide scientific consensus on the merits of geologic disposal is continuing to strengthen. The National Academy of Sciences recent report (NAS, 2001), while not commenting specifically on Yucca Mountain, surveyed waste management programs in 24 countries and concluded, "geological disposal remains the only long-term solution available." |

II. **DOE can continue to strengthen its presentation of the repository safety case (over what has been provided in the DEIS<sup>3</sup> and SDEIS) by addressing the following additional opportunities for improvement in its Final Environmental Impact Statement:**

7 ***A. |Explain key steps leading up to the preparation of the FEIS***

The explanation of the basis for the design changes provided in the SDEIS was a positive step in the direction of providing background information, however, the FEIS should also address the entire chain of events that led to this evaluation. This SDEIS is not an isolated NEPA activity in the Yucca Mountain decision-making process. It is, rather, a key link in an ongoing chain of actions leading up to a presidential decision in 2001 on whether to approve the progression of the repository project at Yucca Mountain to the next steps of completing the designs and seeking an NRC license. The actions that have preceded this SDEIS form the foundation from which it was developed. Accordingly, a soundly based interpretation of this document can best be made in the context of these prior events. |

<sup>3</sup> In our letter to Ms. Wendy Dixon dated February 25, 2000, NEI offered a number of recommendations for strengthening what was presented in the DEIS in preparing the FEIS. These comments revisit our views in these areas in light of the new information presented in the SDEIS.

8 **B. Summarize analytical and scientific processes that led to the results**

Inclusion of biographical information on the SDEIS preparers was a positive step in the direction of providing information concerning the technical and scientific foundation underlying the analysis. However, some evidence of the credentials of the larger scientific team that conducted the work behind the EIS should be provided in the FEIS. In addition, general information could be included to describe controls to assure the accuracy of their work, time and resources devoted to the effort, conservative assumptions applied, procedures and internationally accepted scientific practices followed, and peer reviews conducted. ]

9 **C. Synthesize results and put risks into perspective**

While the DEIS and SDEIS did include summaries of the dose associated with long-term repository performance, more should be done to put the radiological and non-radiological risks into perspective (i.e. providing comparisons against risks associated with other large scale projects). ]

10 **D. Better explain the concept of primary impact indicators**

In the SDEIS, DOE discusses the primary impact indicators selected to evaluate those parameters used to determine the specific impacts in any environmental resources area. The discussion implies that these primary impact indicators are a new concept, when in fact, these are the parameters that DOE determined to be most important during its evaluation of impacts in the DEIS. In the FEIS, DOE should more clearly state that these primary impact indicators are the same parameters used to evaluate the environmental impacts in the DEIS and comprehensively assess the impacts of the Proposed Action. ]

11 **E. Identify Conservatisms**

NEI's comments on the DEIS pointed out that, even though the DEIS found the impacts of the proposed repository to be small, it significantly overestimated these impacts in several areas (NEI DEIS comment V). Our review of the SDEIS indicates that this is still the case. While DOE may have a valid reason for doing this (such as helping to assure decision-makers that impacts are bounded), this approach needs to be more clearly explained. Work that DOE is currently performing on identifying and quantifying conservatisms and other uncertainties in its analysis in response to questions raised by the Nuclear Waste Technical Review Board could be included in this clarification. ]



12 ***F. Explain the Step-Wise Process for Site Recommendation and Licensing***

DOE needs to clearly explain in the FEIS that the NEPA process is not a substitute for the NRC licensing process (NEI DEIS comment VI). At public hearings held recently on the SDEIS, DOE continued to receive comments asking that information that is not required until DOE applies for an NRC license be provided for public comment as part of the EIS process. In responding to these comments, DOE should put the role of NEPA in proper perspective with the subsequent repository licensing process and refer to the significant opportunity for public involvement that exists in the NRC licensing process.

13 ***G. Clarify the appropriateness of DOE's "criteria for repository area selection"***

In Section 2.3.3 of the SDEIS, DOE introduces a set of criteria that are constraints on the location of the below ground repository (type of rock formation, proximity to faults, distance from the surface, and distance from the water table). It is not entirely clear that these criteria are necessary at this time. DOE should either remove these constraints from the FEIS or better explain the reason for imposing them.

14 ***H. Correctly reflect storage cask design standards***

In Section 3.1.15 of the SDEIS DOE makes the following statement regarding the carbon-steel shells in dry storage casks (in the 4<sup>th</sup> paragraph on p 3-19); "The shell... manufactured to less demanding procedures and specifications." This statement is not accurate. While the procedures and specifications are different, they are not necessarily "less demanding". In accordance with NRC licensing requirements, these components are designed to withstand seismic events, provide natural convection cooling, and otherwise meet rigorous standards. This statement should be revised so as not to provide misleading information about the adequacy of the design.

15 ***I. Consistently describe inventories under consideration***

DOE should make clear in the FEIS that the impacts calculated for the "total projected waste inventory" beyond the 70,000 MTHM currently provided by statute are still valid given the changes discussed in the SDEIS. If not, DOE should update its evaluation of these additional inventories in the newer designs for the FEIS.

16 III. **Response to DOE request for comment on whether or not the FEIS should include analysis referring to the DEIS design.**

Yes. The benefit of the additional design information in the SDEIS is that it provides an expanded design envelope, not simply a different design envelope. In keeping with the step-wise repository development process recommended by NAS, DOE should maintain a wide range of design options. This would preserve the opportunity to return to a higher temperature design concept should future information warrant such a change. In considering the FEIS, decision-makers should focus on the fact that *all* of the designs considered thus far in the NEPA process have been estimated to be in compliance with the recently finalized EPA standard. The decision that will be made based on this information is about whether or not the Yucca Mountain site is suitable for a repository, not about which specific repository design is most suitable.

NEI looks forward to seeing DOE continue to advance towards a decision on Yucca Mountain site suitability. We hope our comments on the SDEIS will be useful in this regard. We would be pleased to address any questions the agency may have. Such inquiries should be directed to Rod McCullum at 202-739-8082 (e-mail: rxm@nei.org).

Sincerely,



Steven P. Kraft

Enclosure

c: Mr. Lake H. Barrett, Acting Director, DOE OCRWM  
J Russell Dyer, PhD., Manager, DOE Yucca Mountain Project